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A FLYING VISIT TO DIRK HARTOG AND THE HOUTMAN'S ABROLHOS ISLANDS, WESTERN AUSTRALIA.

BY J. J. WALKER, R.N., F.L.S.

IN November, 1890, H.M. Surveying Ship 'Penguin,' Capt. W. Usborne Moore, was on a voyage from Gascoyne Roads, West Australia, to Fremantle, *en route* for Hobart, Tasmania, after an arduous and successful surveying season on the north-west coast of Australia. On the afternoon of the 12th, while steaming across Shark's Bay, a strong breeze sprang up right in our teeth, and we accordingly anchored, two hours before sunset, in smooth water under the lee of the north end of Dirk Hartog Island. We were within half a mile of the shore, which consisted of sand-stone cliffs about 150 ft. high, and dunes of blown sand covered with rough grass and scattered bushes; nothing like a tree being visible, although such parts of the interior of the island as could be seen from the ship appeared to be fairly well clothed with grass and herbage.

Our boatswain, who was an indefatigable fisherman, soon had his line overboard, but without getting a single bite for a long time. At last he hauled in a very handsome reddish-silvery Bream-like fish, which I recognized at once as the "Snapper," *Pagrus unicolor*, well known and highly esteemed all round the Australian coast. Every fishing-line in the ship was quickly over the side, and for an hour quite exciting sport was

enjoyed, until sunset, when the fish suddenly left off biting. More than a hundred were obtained, varying in weight from ten to fifteen pounds each, and sufficient to serve for three or four good meals for the whole ship's company. They deserved their vernacular name by the eagerness with which they attacked the bait, and when hauled on board made a slight grunting noise, and emitted a peculiar and rather agreeable smell, somewhat like that of our English Smelt, only not so pronounced. The back-fins of numerous small Sharks could be seen above the surface of the water, and I noticed an enormous Turtle floating fast asleep just before the ship anchored.

We were to have resumed our voyage at sunrise the next morning, but the breeze was still very strong from the southward, and we remained at anchor. Early in the forenoon a boat was sent on shore to procure some sand, and I was by no means slow to avail myself of the opportunity of landing on this out-of-the-way island. The beach, on which there was little or no surf, was composed of fine yellow sand, broken at low-water mark by ledges of dead coral; and the first thing which struck me on commencing to ascend the cliffs—which were not particularly steep, but fatiguing to climb under the blazing Australian sun, owing to the deep loose sand which covered the slopes—was the much greater variety and the totally different character of the vegetation from what I had met with all along the coast to the northward and eastward as far as Port Darwin. I had evidently come within the boundary of the rich, varied, and most peculiar flora of South-Western Australia. Not, indeed, that there was any very great luxuriance, even the Eucalypti and Acacias, of which there were several species; being mere bushes not exceeding six or seven feet in height. Large clumps of a bright yellow "everlasting," diffusing a pleasant aromatic scent, grew at the base of the cliffs; and on their summits the general character of the vegetation was somewhat like that of an English heath, or still more like the varied growth on the open treeless waste lands in the south of Spain near Gibraltar, but almost every plant was entirely strange to me. Of animal life there was very little; I saw one Kangaroo-rat, a creature about the size of a Rabbit, and a few small Lizards. In places somewhat sheltered from the breeze two or three species of blue butterflies were flitting about



and some pretty little beetles were found by examining flowers; while the dead shells of a small, but rather handsome *Bulimus*, *B. onslowi*, Cox, were plentifully scattered over the sand, though no living examples could be found. The southern part of Dirk Hartog Island has, I believe, been occupied as a sheep-run, but the northern half is marked "uninhabited" on the chart; and indeed it seemed to me as if no human being had ever set foot on this desolate shore. In accordance with a standing order of the ship, I carried a navy revolver for defence against possibly hostile natives, but here at any rate it seemed somewhat unnecessary.

After walking along the top of the cliff for nearly a mile, I saw the recall-flag hoisted on board the ship, and repaired without further delay to the boat; and the wind having moderated a good deal, we left our anchorage in the afternoon for Geraldton, in Champion Bay. On getting through the "Naturaliste Channel," between Dirk Hartog and Dorre Islands, into the open ocean, we found the breeze still very strong and dead against us, and a heavy head sea developed the capacity of the 'Penguin' for pitching and rolling to its utmost extent. The next two days were uncomfortable enough, as, although the weather was fine and bright, the southerly gale was as strong as ever, and all the steam-power which we could obtain with the detestable Australian coal we had on board did not suffice to force the ship against the head sea in the direction of Champion Bay. On the morning of the 16th it became evident that, under the present circumstances, our remaining supply of coal would not be sufficient to enable us to visit that port and go on thence to Fremantle; so our course was altered for the Houtman's Abrolhos, to which we were now quite close, and where it was proposed to remain until the weather moderated. Towards noon the northern outliers of this little archipelago of islets and coral-reefs were sighted, and soon afterwards we were snugly at anchor, in smooth water about a mile from the shore, under the lee of East Wallaby Island.

Although I regretted that our visit to Champion Bay, where I had expected to meet with many fine beetles and other insects, had to be postponed, if not altogether abandoned, I was by no means sorry that this opportunity had occurred of landing upon one of these remote and even now little-known islands. In many

respects the Houtman's Abrolhos are of great interest, as they are, with the single exception of Bermuda, the locality farthest removed from the equator where reef-building corals are to be found in active growth; and, although they can scarcely be regarded as true "oceanic islands," being only ninety miles from the west coast of Australia, and the soundings between them and the mainland not exceeding one hundred fathoms, several peculiar forms of animal life (and I believe some peculiar plants also) have been developed upon them. They are memorable, too, in the early history of Australian exploration, as having been the scene of the disastrous wrecks of two Dutch discovery ships. The first of these, the 'Batavia,' Commodore Pelsart, was lost in 1627 on one of the southern islands of the group, a small remnant only of her crew reaching Java, after terrible sufferings from want of food and water. The mouldering timbers of this vessel were found by Capt. J. L. Stokes during his visit to the islands in 1840. The other ship, the 'Zeewyk,' was wrecked here in 1728, her people, more fortunate than those of the 'Batavia,' escaping to Java in a sloop built of fragments of the wreck. Many relics of this disaster were also found by Capt. Stokes, including a very curious brass four-pounder with a movable breech-block, showing that breech-loading guns are not entirely a modern invention; this gun is, I believe, to be seen in the museum of the Royal United Service Institution. Capt. Stokes also mentions the finding of numerous square bottles, arranged in rows in the sand, and evidently used for the storage of water by the shipwrecked crew. I afterwards saw some of these bottles in the museum at Perth.

The Houtman's Abrolhos were first closely examined by Capt. Stokes, of the famous little surveying-ship 'Beagle,' in April and May, 1840, and many interesting details are given in his narrative of the voyage ('Discoveries in Australia,' vol. ii. pp. 140-166). Of late years the large deposits of guano on Rat Island and other southern members of the group, to which he was the first to direct attention, have been actively worked by a West Australian firm, but the northern islands are very seldom visited.

I went on shore on East Wallaby Island soon after the ship anchored, with three of my messmates, who were bent on

shooting, and we landed without any more inconvenience than a walk of a few yards over a rugged coral-reef in shallow water. The island does not in any part exceed fifty feet in height, and its shape may be described as a roughly equilateral triangle, each side measuring rather more than a mile in length, and with a long projection from the north-eastern angle. The soil consists almost entirely of clean white calcareous sand, on a base of coralline limestone, which crops out here and there in wide stretches covered with loose blocks, and contains many recent corals and shells in very good preservation. Along the shore this limestone is broken into miniature cliffs eight or ten feet high, curiously undercut by the action of the waves. Much of the island is covered with tolerably dense but low brushwood, with white sand-drifts showing here and there, and a small cairn with a weather-beaten pole on the highest point marks the visit of some former surveyor, possibly of Capt. Stokes himself.

Scarcely two minutes had passed after we landed before the report of a gun was heard, and a "Wallaby" was its victim. Before sunset no fewer than thirty-five of these animals were shot, and any number could have been obtained if wanted. Indeed, they might have been literally said to swarm among the low brushwood, and I was continually meeting with them. They evinced very few signs of alarm, and went off at quite a leisurely pace, and with more of a running than a leaping action. This species is the *Halmaturus houtmanni* of Gray, discovered during the visit of H.M.S. 'Beagle'; it is peculiar to the Houtman's Abrolhos (though closely allied to a West Australian form), and appears even to be confined to this and the adjacent West Wallaby Island, not being found in the more southern islands. It is about the size of a large hare, standing, when erect, nearly two feet high, and weighing from seven to ten pounds; the fur is rather long and soft, and of a general dark brown colour, a little paler on the under parts. These Wallabies, with others shot on the following day, were served out as fresh meat to the ship's company, but except at first were not much appreciated; the flesh was tender, but very dark in colour, and flavoured with the strong-scented herbage on which the animal subsists. We found they made very tolerable soup.

I rambled about the island until sunset, finding the vegetation

almost entirely of a shrubby character, and not very easy to get through in some parts. *Compositæ*, *Chenopodiaceæ*, and *Rutaceæ* seemed to be the prevailing natural orders, with a few stunted *Acacias*, as well as a small round-topped bush or low tree with a stem about as thick as one's leg, and ovate leathery leaves, which was not in flower at the time; so I could not make out its affinities. The beach above high-water mark was clothed with "bent-grass," and in some of the more open parts a yellow *Senecio*, and a *Mesembryanthemum* with bright pink flowers, carpeted the sandy soil. Except for the Wallabies, there appeared to be no great amount of animal life, as this island, unlike the southern members of the group, is apparently not a breeding station for sea-birds. I could find no traces of guano in any part, nor any burrows of the Sooty Petrel or "Mutton-bird," *Thiellus sphenurus*, Gould, though a good-sized black Petrel, presumably of this species, was commonly seen on approaching the anchorage, and the adjacent West Wallaby Island is described as being a perfect warren of these birds (cf. Stokes, *loc. cit.*, and Gould, 'Handbook, Birds of Australia,' vol. ii. p. 466). Neither could I meet with any evidence of the two Noddies, *Anous stolidus*, Lath., and *A. melanops*, Gould, or of the Sooty Tern, *Sterna fuliginosa*, Gmel., all three of which breed in such multitudes on Rat Island and others of the south islands, nesting in the scrub. Along the sandy beaches, which were encumbered with great piles of washed-up *Zostera*, numerous Gulls and Terns were to be seen, the former being represented by the common Australian species, *Larus novæ-hollandiæ*, Steph., and the large and powerful *L. (Gabianus) pacificus*, Lath.; while the latter included, among others, the handsome "Caspian Tern," *Sterna (Hydroprogne) caspia*, and the delicate little *Sternula nereis*, which the late Mr. Gould, its describer, aptly calls "a beautiful representative, in the Southern Ocean, of the Little Tern of the European seas. Occasionally an Osprey, or an Australian Sea-eagle, *Polioæetus leucogaster*, Lath., was to be seen soaring high overhead; and on the coral-flats left bare by the receding tide, the pretty little *Ægialiphilus ruficapillus*—very similar in habits, and also, except for its chestnut-red head, in appearance, to our own Ringed Plover—was busily feeding in company with Black and Pied Oystercatchers, *Hæmatopus fuliginosus*, Gould, and *H. longirostris*,

Vieill., these latter being remarkably tame, and allowing themselves to be approached within four or five yards.

Lizards were fairly numerous, both in the open and under the blocks of coralline limestone, but I did not see more than three or four kinds. Of these, the most remarkable was a dark grey, rather spiny species, sometimes nearly a foot in length, with an exceedingly long tail (*Amphibolurus barbatus*). This was by no means rare, and, although active enough, was so tame, or rather so stupid, as to be caught without the slightest difficulty. A little red-headed Lizard, which I had frequently seen on the islands off the north-west coast of Australia, was, on the contrary, as nimble and wary as these creatures usually are, and I could not succeed in securing a specimen. Under the stones I found a very curious "Gecko," *Phyllodactylus marmoratus*, with a thick carrot-shaped tail, suddenly constricted at the base. The wind was too strong for insects to be moving freely, but I found a good many small but interesting beetles, chiefly by searching in the sand at the roots of the bent-grass. Numbers of land-shells, all of minute size and mostly dead, were strewn about in hollows among the sand-hills; they principally consisted of several species of *Pupa* (three of which, *P. contraria*, Sm., *P. wallabyensis*, Sm., and *P. mooreana*, Sm., were undescribed), with a little *Truncatella* found abundantly near the shore, where it was accompanied by many weathered shells of the well-known and widely distributed *Spirula australis*.

The wind had gone down somewhat on the next day (17th), but not sufficiently so as to induce us to leave our anchorage; and a party of five officers, including myself, left the ship after an early breakfast to spend a day on the island. We hauled our boat up on a sandy beach, on which I found numerous specimens of a pretty little weevil of the family *Cossonidæ* under the heaps of *Zostera*; and then each went his own way, my messmates to shoot, and I to look for insects, or anything else that might turn up. By keeping under the lee of the high sandy banks next the sea, where the sun was hot and the breeze was not so much felt as elsewhere, I soon found some butterflies on the wing. These were of two species only—a little "blue" (*Lycæna* sp.), and a very pretty little "skipper," in appearance recalling our British *Cyclopides paniscus* on the upper side, and handsomely marked

beneath with silvery-white spots and bands on a tawny ground. It proved to be the rare *Telesto argenteo-ornatus*, Hew., previously recorded from "Western Australia"; and as it was fairly common here, I did not neglect to secure a good series. A good-sized black-and-white day-flying moth (*Nyctemera* sp.) was also not uncommon. I walked over to the far side of the island, and spent some little time in looking for shells on a stretch of coral-reef left dry by the receding tide, but met with very little success. A large light-coloured *Purpura* (*aegrota*), which had in almost every instance several specimens of a *Crepidula* partly embedded in the substance of its thick shell, was almost the only species observed. Many more shells were to be picked up on the sandy beaches, two handsome species of *Voluta* (*nævosa* and *volva*) being met with among others; and a Pearly Nautilus, in very good condition, surely a long way out of its latitude, was found by one of the boat's crew. Large numbers of the dried and bleached skeletons of sponges were strewn along the beach at high-water mark, and I came across a rounded block of pumice, much bigger than a man's head, which had drifted hither from some far-distant volcano, perhaps from Krakatao.

At noon we all met at the landing-place for lunch, of which the *pièce de résistance* was a boiled Wallaby shot that morning. A very little of this creature, however, went a long way, as it was about the most unpalatable dish I have ever tasted. This arose from the fact that the cook had forgotten the salt, and we had none of this necessary article with us. Sea-water was suggested as a substitute, but it could not be used, as all the water near the shore was charged with sulphuretted hydrogen, arising from the decay of the seaweed and *Zostera* washing about in it. The first lieutenant's face was a study when his beautifully white-painted whale-boat returned to the ship in the evening stained all over with a rusty-black hue, by the action of this gas on the white-lead paint. My messmates had enjoyed fairly good sport, as, besides the Wallabies, there were numbers of a very beautiful "bronze-wing" Pigeon, *Phaps elegans*, Temm., among the low bushes; and in the more open grassy places, a Bush-Quail, *Turnix scintillans*, Gould, was frequently flushed. This latter species is a little bird of sober though beautifully varied plumage, and appears to be peculiar to the Houtman's Abrolhos, having been first obtained there during the visit of the 'Beagle' in 1840.

In the afternoon I walked to the eastern extremity of the island, which part is more open than elsewhere, with extensive stretches of almost bare limestone rock. Water appears to stand here in places during the rainy season, as I found a good many empty shells of a species of *Succinea* (*scalarina*, Pfeiff.), as well as some very young living specimens adhering to the under side of large stones. I was very much pleased to find here the remarkable Scincoid Lizard, *Egernia (Silubosaurus) stokesii*, Gray, discovered by Capt. Stokes on Rat Island in the southern part of the group ('Discoveries in Australia,' vol. ii. p. 145), and exceedingly well figured in the Appendix to that valuable work. The first specimens were obtained by raising a large flat block of limestone, under which several were snugly stowed away; these were secured without the least trouble, as for a Lizard it is the most sluggish and stupid creature imaginable. It is, however, able to give a pretty severe bite, and holds on to any object which it has seized with its jaws with the tenacity of a bull-dog. The largest examples attain a length of nine or ten inches; it is of a rather stout and clumsy build, with short legs, and is covered with rather shining keeled scales, which on the tail assume the character of short spines. In colour it is a rich and peculiar blackish olive, thickly mottled with pale yellow spots, which are confluent on the under parts. The habits of this Lizard appear to be somewhat predatory, and in all probability it is of this species that Mr. Gould's collector, Gilbert, speaks in his very interesting notes on the breeding of the Terns, &c., in the Southern Abrolhos ('Handbook, Birds of Australia,' ii. pp. 414, 415). He writes as follows:—"By the middle of January the eggs [of *Anous stolidus*] were nearly ready to hatch, and there would be an overwhelming increase of this species yearly but for the check which nature has provided in the presence of a small Lizard, which is very abundant in their breeding-places, and which finds an easy prey in the young of this Noddy and of *Sterna fuliginosa*. I am satisfied that not more than one out of every twenty birds hatched ever reaches maturity, or lives long enough to take wing; besides which great numbers of the old birds are constantly killed. These Lizards do not eat the who'e bird, but merely extract the brain and vertebral marrow; the remainder is, however, soon cleared off by the *Dermestes lardarius*,

an insect which occurs in amazing numbers, and gave me a great deal of uneasiness and constant trouble to preserve my collection from their repeated attacks." (I may remark that I saw no trace whatever of this beetle on East Wallaby Island, though I was specially on the look-out for Coleoptera.)

Soon afterwards I found the *Egernia* quite commonly in a rather restricted space, but always under stones, and never seen in the open. I brought off six or seven of the largest in a bag, most of which were subsequently consigned to the spirit-tank as specimens; but I kept two alive for several months afterwards, feeding them when they would eat, which was but seldom, on small pieces of raw beef. As the afternoon was now well advanced, I went down to the landing-place, where I found the whaler almost filled with game, a large number of Wallabies having been shot, chiefly for the benefit of the ship's company, but without any apparent diminution of their numbers when we landed on a subsequent occasion.

We were still detained at our anchorage on the 18th by the wind, which had sprung up again very strongly from the old quarter, accompanied with exceedingly brilliant sheet lightning after sunset; and no boat landed on the island that day. Contrary to our expectations, fishing from the ship met with very little success, only two or three "Snapper" and several Blow-fish, *Tetraodon levis*, being caught; the latter were a nuisance, as, besides being quite useless, if not actually dangerous, as food, their powerful front teeth at once severed almost any hook that was put overboard. Sharks were, if anything, more numerous than at Dirk Hartog Island, and several were caught and despatched by the sailors during the day; the stomach of one about eight feet long (which appeared to be the widely distributed *Galeocerdo arcticus*) contained, besides the carcases of two or three Wallabies which had been thrown overboard, more than a bushel of the remains of a large species of Sea-crawfish (*Palinurus* sp.), among which were some nearly perfect specimens.

On the 19th the southerly wind continued very strong all the morning, but the day was otherwise fine, and in the afternoon I was able to land again for two or three hours. A few fresh species of beetles rewarded my search, as well as several more fine specimens of Stokes's Lizard, which as before I could find

only in one small spot near the east end of the island. Ascending a low hill on the north shore, I obtained a good view of the adjacent West Wallaby Island, which was connected to the eastern island by an almost continuous series of reefs and coral-flats, so that it appeared quite practicable to cross from one island to the other on foot at low water, the distance being about two miles. Close to this hill was one of the two wells or watering-places mentioned by Capt. Stokes in his account of the island ; this was a circular hole in the limestone rock, about a yard in diameter and ten feet deep, with a few inches of slightly brackish but clear and fairly good water at the bottom. No more Wallabies were shot to-day, as the men had got tired of them ; but a fair number of bronze-wing Pigeons and several specimens of the peculiar Quail were bagged by our sportsmen.

We were able at last to get away from our anchorage at day-break on the 20th, and, abandoning finally our proposed visit to Champion Bay, as our stock of coal on board was very low, we shaped our course direct for Fremantle, where we arrived on the morning of Nov. 22nd.

EARTHWORM STUDIES.

BY THE REV. HILDERIC FRIEND,
Author of 'Flowers and Flower-Lore.'

III. PHOSPHORESCENCE AND LUMINOSITY.

AMONG the various members of the Animal Kingdom which possess the power of emitting a phosphorescent glow are certain inhabitants of Wormland, to some of which we wish to draw attention. The notice of the public, so far as my researches show, was first directed to the subject in the year 1670 by Grimm; but scientific observation was then scarcely known. Later came Flauguergues in 1780; his paper on the phosphorescent light of Earthworms appearing in 'Lichtenberg's Magazin' in the German language. It may also be seen under the French title "Sur la Phosphorésine des Vers de terre" in 'Rozier Journ. de Phys.,' xvi. (1780) pp. 311-313. In 1873 Cohn's observations on the same subject were published in the 'Zeitschrift für Wissenschaft. Zoologie,' vol. xxiii. pp. 459-461, and entitled "Leuchtende Regenwürmer"; while numerous recent writers have further contributed to our knowledge, especially in relation to the continental species. Thus in 1872 an article appeared in the French 'Ann. Sci. Nat.' ser. 5, t. xvi. by Panceri, entitled "Etudes sur la phosphorescence des animaux marins," in which he states that the luminosity observed in the case of certain worms is due to a secretion from the girdle where special glands exist, and that with the evolution of light there was no perceptible raising of the temperature. In this respect, therefore, the glow corresponds with that emitted by the Firefly, *Noctiluca*, and *Glowworm*. One investigator at least has tested the colour and composition of the luminosity by the spectroscope, and says that it is not uncolored or monochromatic, but compounded chiefly of the red and violet rays. Other students regard the substance which produces the light as homogeneous.

In 1838 Eversmann published an article in Russian on a night-shining worm (*Lumbricus noctilucus*, see *Zapisk. Kazan. Universit.*, 1838, pp. 156-7), and in 1871 Breese, an English naturalist, delivered an address on the Earthworm before the West Kent Natural History Society, from a meagre abstract of which we learn that he had spent some years on the subject of annelid luminosity, having studied it historically from the year 1805, when Viviani wrote on the phosphorescence of the sea, down to the date of his own investigations. According to Breese the luminosity exists in the excreted glutinous material with which the outer skin of the animal is covered. It is much to be regretted that (so far as I can learn) the researches of this naturalist have never been given to the public in detail.

More than one creature has at different times borne the name of the phosphorescent worm. In 1837 Dugès, a French writer, described a species under this name (*Lumbricus phosphoreus*) with a girdle extending from the 13th to the 16th segments, and a somewhat flattened body behind. After the lapse of exactly half a century this curious creature was examined again, and named by Giard *Photodrilus*, or the luminous worm. It has eight setæ just as our common species have, but they are separate, and not in couples. There is no gizzard, nor does the lip dovetail into the segment behind. It is a small, transparent, rose-coloured worm, and decidedly phosphorescent.

A paper on this worm by Barrois appeared some time ago under the title "Sur la présence du *Lumbricus* (*Photodrilus*) *phosphoreus*, Dugès, à Groffliers (Pas-de-Calais)" in the 'Revue Biolog.', iii. pp. 117-119. Beddard places it under the genus *Pontodrilus*, and gives the following brief summary of its characters and history:—

"**DEFINITION.**—Length 50 mm.; diameter 2 mm.; number of segments 110. Setæ in eight rows. Clitellum xiii.-xvii. Hearts in x.-xii. Sperm-sacs in xi., xii. Spermathecae in ix. with a diverticulum. **Habitat**—France.

"This species has been investigated by Giard, who, however, has not yet published an illustrated account of his researches. The main facts in its structure are given in the above definition. In addition to the points there mentioned there exist on segments xii., xiii., and xviii. sacs of modified setæ in addition to

the ordinary ventral setæ; instead of a bundle of about four setæ there is sometimes only a single seta. This worm appears to be luminous at night, whence the name given to it by Dugès."—Beddard, 'Monograph of Oligochaeta (1895),' p. 472. It is now known as *Pontodrilus phosphoreus* (Dugès).

In 1843, when the British Association met at Cork, specimens of an annelid were exhibited by Dr. Allman, which he had discovered in the bogs of the south of Ireland, and which was the cause of a luminous appearance. When irritated the worm gave out a phosphorescent light, which is said to have been much increased by exposing the creature to the vapour of alcohol. The light was of that peculiar soft greenish hue which is characteristic of the phosphorescence usually observed in living animals, and familiar to most readers in connection with the Glowworm. It was said to be closely allied to the Earthworm. Another gentleman was reported to have observed the same peculiarity in some annelids which exist in the bogs of Connaught. I have been unable to find any recent reference to or confirmation of these curious observations, and this though I have examined many hundreds of specimens of terrestrial and aquatic worms from different parts of Ireland, have made special enquiries, and even visited Ireland myself in 1896 purposely to examine the annelid fauna for the Royal Irish Academy. Ten years later Mr. Henry Cox exhibited an Earthworm which was phosphorescent at a meeting of the Literary and Philosophical Society of Liverpool, held November 14th, 1858.*

While few records of a reliable nature respecting the observation of luminous worms in Britain are available, a good deal has been done by our continental fellow-workers. Vejdovsky, who wrote a very valuable work on the various species of annelids in 1884, entitled 'System und Morphologie der Oligochaeten,' gives us some results of his personal experience, which I believe have never been placed before the English reader. He says that he had the good fortune once to observe an interesting case of

* See 'Proceedings,' No. viii., p. 57. In 1898 I received news of a phosphorescent Worm having been found in London, but it proved on examination to be not a Worm at all. In fact, many of the instances of so-called phosphorescence in worms may be traced to the popular habit of calling centipedes and all other lowly wriggling creatures by this comprehensive name.

phosphorescence in connection with the Brandling. It was one warm July night in 1881, when he was exploring a dung-heap. (Naturalists do not usually work with kid gloves and diamond rings.) Presently a spot of soft, bluish white light appeared, which, however, was changeful and unsteady. Now it would disappear, then return anew and shine forth over a larger space, though never with a brilliant hue. He thereupon removed a portion of the manure from the spot where he had observed the luminosity, and found that the light appeared brighter, and shone for a longer time without disappearing, or before it migrated to another spot. By means of a lantern Vejdovsky was able to secure a large number of specimens of the Brandling from the dung-heap, which he placed in a vessel for the purpose of subjecting them to careful observation. To his great surprise he found that his finger soon glowed in the darkness with the phosphorescence, which extended generally over the hand where it came into contact with the worms. It was therefore apparent that the luminosity was the product of a fluid secreted by the cutaneous glands, which had attached itself to the hand of the investigator, and now manifested itself in this curious way.

We have an interesting observation on the same subject by Prof. Von Stein, which was published at Leipzig in 1883. One evening in the middle of September, the Professor was spending some time with a circle of friends at a parsonage not far from Potsdam, when the conversation turned upon phosphorescence and the phenomena of light. Hereupon one of the younger members of the family—who are usually the keenest and most shrewd observers of Nature, and the best friends of the naturalist—remarked that there were fountains in the adjoining gardens, the water from which was frequently observed to be full of light-bearing creatures when it was violently agitated. He regarded the affair at first simply as a hoax, or an attempt to make a fool of him,—as people are ever ready to do with a hobby rider,—but ascertained eventually that the luminosity was due to the presence of a species of Worm which possessed the property of shining when disturbed. As with Vejdovsky, so with Prof. Von Stein, the finger which had come into contact with the Worm continued to glow for some time after. What species of Worm was under observation is not recorded.

In the 'Report of the British Association' for 1887 (p. 767) we have a note by Mr. Harker "On a Luminous Oligochaete." But here again the same remark applies. Much good work, alas! is rendered valueless for want of a little accuracy in nomenclature.

It now becomes a question what end could be served by the possession of this property. The philosopher no sooner learns a new fact than he begins to pry into the secret which lies beneath, and stands to it as cause to effect. We have analogy to guide us. The water worms may be compared with the marine animals which produce phosphorescence, while the Brandling may be studied in the light of a Glowworm. It may be objected that as worms, except in a few rare cases, have no eyes there can be no advantage in their luminosity. But such an argument would be based on the erroneous assumption that a creature without eyes is incapable of receiving impressions from light. That worms are influenced by light is proved both by their habit of avoiding it, and by the experiments which have been carried out by various students. Darwin remarks that as worms are destitute of eyes he at first thought that they were quite insensible to light. He found, however, that "light affects worms by its intensity and by its duration." Hoffmeister states that, with the exception of a few individuals, worms are extremely sensitive to light, and from my own observations I have been able to demonstrate that there are marked differences in the susceptibility of the different species—some being very much more susceptible than others.

Now it follows that if a number of species of worms lived together in one place, as they usually do in a manure-heap, it would be a great advantage for a given species to possess a distinguishing feature, such as that of luminosity, to enable two individuals to discover each other's whereabouts, just as the male Glowworm detects the female by the light emitted from her upturned abdomen.

Viewed in this light, a new field of research is opened up which hitherto has been totally unworked, but which may be hoped to yield remarkable results if diligently, patiently, and intelligently tilled.

It will not be out of place in this connection to quote from

the 'Gardeners' Chronicle' of January 9th, 1847, some very interesting remarks by Mr. J. Wighton on insect luminosity, seeing that many cases of phosphorescence attributed to worms really come under this head. He says:—

"The Centipede (*Scolopendra electrica*, L.) is one of the few luminous insects met with in this country. Its specific name *electrica* seems to be a misnomer; *lucifera* or *phosphorifera* would be more applicable. It would take a large number of Centipedes to give a sensible shock, even supposing the creature capable of doing so at all. In other electric animals, as the *Torpedo*, no flash appears, even when they give a discharge strong enough to stun a horse; still less do they shine with the steady light of the Centipede or the *Glowworm*. The luminosity of the *Scolopendra electrica* appears to proceed from a clammy slime exuded from the body of the insect, which is analogous to the phosphoric mucus that comes from the skin of certain fishes in an early state of decomposition. Like that, it may be removed from the surface from which it proceeded, and objects smeared with it become luminous. Walking one damp night on a dark road, I picked up something shining from the ground; I screwed it up in paper, and took it home. On unfolding the paper a Centipede crawled out and escaped, leaving its phosphoric slime adhering to the paper. It is doubtful for what purpose this secretion is given to the insect. It can hardly be to attract the opposite sex, as its habits are mostly subterranean, appearing to feed on dry half-decayed roots and leaves, and in no way injurious to living vegetation, but probably beneficial by admitting air into the soil, and preparing dead organic matter to be more quickly suited for the food of plants. Some mention that it is carnivorous, feeds on small insects, and like the *Lithobius forcipatus*, or 'Fifty-foot,' of which it is said that it wounds its prey with a venomous fluid emitted from its claws, but I think this cannot be relied on. Indeed it is difficult to do more than guess at the final causes of many curious phenomena among animated beings. One author (De Geer) says that it is by no means certain that the light of the *Glowworm* is given it for the purpose of inviting the male, because he has proved that the female insect can shine in its infant state, in that of larva, and even after it has taken the form of nymph. But the same sort of reasoning would lead us to

conclude that, because milk is found in the breast of a new-born babe (a singular fact, best known to every nurse), when it cannot be required to give suck, therefore the same child is not to give suck when she has become a woman, and has children of her own.* The light of the Glowworm proceeds from a lantern in the under side of the tail, protected by a transparent skin. The researches of such an anatomist as Swammerdam would probably find a dark shutter or slide between the glass of the lantern and the lamp within, moveable at the pleasure of the insect. If you crush a Glowworm while it is shining, the light will smear about exactly like that of the Centipede. I have never tried the experiment by day, or at times when they do not shine. The Glowworm appears to know, by an unerring instinct, the proper time for it to begin its exhibition, which is shortly after sunset. I have repeatedly kept them all day long in a dark cellar without being able, by the gloom or the coldness, to make them withdraw their curtain; but on returning in the evening, I have found them glittering as brightly as in their native copse. The best way to keep them in confinement is to have a live turf at the bottom of a glass globe. All day long they remain hidden close to the earth, but at the appointed hour of evening they will mount the blades of grass as high as they will bear them, turn up the ends of their tails, and display a splendour more steady and beautiful than either gas or camphine. The duration of their performance is very variable, sometimes not more than half an hour, sometimes till what the Scotch call the 'sma' hours.' Whether this depends upon the weather or the health of the creature, is best known to itself. After a while, also variable, they lay their eggs among the turf, and themselves in the dust, to shine no more. So briefly perish these stars of the earth, in fit contrast with those of heaven, glittering as they do, through ages upon ages, with undimmed and never-tiring lustre."

It is curious that among all the suggestions which have been offered to account for the luminosity of the worm we find no mention of the use of phosphorescence for protection. When the water was agitated, Von Stein's worm became luminous. Was not that protective? The enemy of the Centipede, Glowworm, or annelid would fear the fire, and keep at a respectful

* An illustration and argument drawn from Kirby and Spence.

distance. The Brandling, tit-bit of Trout and other fish, may readily be supposed to exhibit a luminous skin when attacked or affrighted; and the fact that these lowly creatures seldom appear luminous except when irritated or exposed to danger, apparent or real, lends probability to the idea that the phosphorescent display is protective. A light flashed out in time of danger would scare a would-be intruder, which would soon become used to a regular light and learn its innocuousness. If, as Pietro Martire tells us, the people of the West Indies were alarmed when they met a fellow in the dark whose face had been smeared with the phosphorescence of an insect, it is not unreasonable to suppose that a Trout would be alarmed if a Brandling suddenly lighted its lamp. Further observation on this subject is greatly to be desired. At present it is far from being as complete as the scientist could wish. In the 'American Naturalist' (vol. xxi. p. 773-4) is a note by Mr. G. F. Atkinson entitled "A Remarkable Case of Phosphorescence in an Earthworm," which I have unfortunately been unable to consult. Reference may also be made to Moniez's paper in the 'Rev. Biol.,' i. pp. 197-200, Kirby and Spence's 'Introduction to Entomology,' and Secchi, 'Nouv. Observ. in Ann. Sci. Nat.,' series 5, vol. xvi., 1872, p. 68.

FROM BUFFON TO DARWIN.

BY THE REV. T. R. R. STEBBING, M.A., F.R.S., F.L.S.

[The Author has favoured us with the following revised report of his Presidential Address to the First Congress of the South-Eastern Union of Scientific Societies, held at Tunbridge Wells in May last.—ED.]

THE Societies which have joined our Union are almost exclusively Natural History Societies. They are quite friendly to philosophy and literature, to mathematics and chemistry, to agriculture and political economy, to astronomy and the use of the globes, but they find their own more special and serious employment in zoology, botany, and geology. Towards these branches of knowledge the attitude of the public mind has changed in an extraordinary manner during the last hundred and fifty years. Fully to explain how this change has been brought about would require a volume—such a volume as Sir John Lubbock, or Sir Archibald Geikie, or Mr. Lecky might produce with fascinating effect. My intention to-day is only to recall briefly to your memories some of the more striking factors in the revolution.

In the forefront may be set a certain number of men whose work has had the distinctive quality of sooner or later exciting enthusiasm.

Of the French naturalist Buffon it has been said that “the warmth of his style and the brilliancy of his imagination are inimitable.” In these days we are inclined to cavil when too much of the imaginative element is introduced into descriptive zoology, but Buffon had knowledge as well as brilliance, and was able by this combination to win the attention of Christendom to his accounts of the animal kingdom. Evidence direct and indirect of his merit and importance may be drawn from two very different sources. The direct is found in the circumstance that the famous French school of zoologists in the first half of this century called their encyclopædic history of animals ‘*Suites à Buffon*.’ They were content to describe it as a continuation of

what Buffon had begun. The indirect evidence may be taken from our own Oliver Goldsmith, of all English authors perhaps at once the most vain and the most delightful. He himself wrote a Natural History, though he can scarcely disguise his contempt for naturalists. He confesses that at first he had thought of translating the credulous Pliny, and of adding his own precious comments to make the work amusing, treating, as he says, what he then conceived to be an idle subject in an idle manner. But Buffon's 'History of Quadrupeds' appeared, and Goldsmith bowed to the authority of a master mind.

The same year that gave Buffon to France gave to Sweden Linnæus. His name, like Shakespeare's, is one of the few so perfectly familiar everywhere, so universally renowned and cherished, that the owner of it seems to belong to every land as much as to his actual birthplace. He taught the world that Nature has a system. He took all naturalists for his pupils, and taught them how to speak. He taught them, I mean, how to name the objects of their study. He did in this respect for science what the inventors of money did for trade and commerce. He bade us designate each species by a couple of words instead of by a descriptive paragraph. By thus making simple and easy what before was complicated and cumbrous, he for the first time made possible a thorough discussion of all plants and animals, and threw open the study to mankind at large. Moreover, he took for his pupils men of special devotion, Kalm and Hasselquist and Forskål and many others, and sent them travelling over the world to observe its treasures. He made an orderly record of all the natural history objects discovered by all men everywhere. He gave, in short, by his example and by his teaching, by what he himself did and by what he induced others to do, such an impetus to our science as no one man had ever given it before.

The name of James Hutton is far less dazzling, by far less widely celebrated, than that of Linnæus; but it has been shown by those competent to judge that Hutton's services to science were of the order which can truly be described as epoch-making. His 'Theory of the Earth' upset many ancient opinions as deeply rooted as mountain chains, as widely spread as the main oceans. Contrary to the apparent evidence of men's senses, he maintained that the crust of the globe is a great piece of machinery perpetually

at work. When you travel between Tunbridge Wells and London, you know that the train on the railway is kept going under the influence of fire and water. But before Hutton men little realized that the everlasting hills and seas with barriers supposed to be impassable were likewise under the influence of fire and water repeatedly exchanging places. When Hutton put forward the truth, there were few at first to believe it.

Before Hutton died, William Smith was at work. No Linnaeus has yet arisen to regulate the naming of human beings. Therefore this William Smith has to be distinguished from others of the same name in an unscientific and roundabout manner. By one of the singular genealogical expressions which are used to confer honour, he is known as "The Father of English Geology." He became the parent of this giant offspring when he was as yet little more than a boy, by discovering the laws of stratification. He made it clear that the layers of the stratified rocks could not have all been formed at once, that the sequence in position of upper and lower implied a sequence in age of newer and older. If in housebuilding it would be difficult for a man to begin with the attics and the roof, and afterwards to lay the foundation and construct the ground-floor, it would be equally difficult for Nature, after laying down one stratum upon the ocean-bed, to deposit a newer one, not on the top of the older, but underneath it. William Smith showed, moreover, that the relics of life are not distributed hap-hazard through the water-formed rocks, but that over large areas there is a definite relation between the age of a stratum and the character of its fossils, from which it follows that, at least within those areas, at different ages of the rocks there have been differing sets of living organisms. In this respect the strata must not be compared with our houses, for an old Elizabethan mansion may shelter a family of the Victorian age, and the same ancient abbey enshrine the bones of warriors and poets of many successive periods; but in an old Silurian stratum you will never find Cretaceous or Miocene fossils.

Born in the very same year with William Smith, but in a different rank of life, was the illustrious Cuvier, Georges Chrétien Léopold Frédéric Dagobert, Baron Cuvier. Goldsmith somewhere speaks of the public as "that miscellaneous being, at

variance within itself, from the differing influences of pride, prejudice, and incapacity." The genius of Cuvier was able to inspire this "miscellaneous being" with an interest in the science of comparative anatomy. Few minds could fail to be struck and powerfully impressed by the wonderful principle of correlation, which enables the skilful anatomist from a small portion of an organism ideally to reconstruct the whole fabric; from a fossil tooth, to explain the shape, the food, the habits of an animal that had never been seen by the eye of any mortal man. Round Cuvier gathered a great band of scientific workers, and in his own special subject he remains the monumental standard of comparison by which other men's abilities are estimated.

A colloquial but expressive phrase describes a dull boy by saying that "he will never set the Thames on fire." In the estimate of his friends apparently Charles Darwin was a dull boy. He ended by setting not only the Thames on fire, but the whole world ablaze, with the light and heat that his speculations kindled. What Linnæus had been to the latter half of the eighteenth century, that was Darwin to the latter half of the nineteenth. The artificial classification of Linnæus is discarded by botanists. Every specialist can in his own subject point out errors committed by Linnæus. And yet the glory of the man remains untarnished. Natural History of the modern era began with him. He is the founder of it. In like manner the fame of Darwin will not suffer diminution, if some of those whom he has sent wandering through the thousand avenues of research find something to correct in his arguments or to modify in his theories. Biology of the modern era began with him. He is the founder of it.

Whether any of these illustrious men personally deserved credit is a pleasing subject ever open to debate. Original ideas always run two risks, first of being condemned as mischievous novelties, and then of being stigmatized as shameless plagiarisms. The ancients have constantly been convicted of stealing our best jokes, and they have evidently tried to rub the gloss off some of our finest scientific discoveries by rather too plainly speaking of them before they were made. Therefore, while extolling the men who seem to have been most signally effective in raising natural science out of obscurity into prominence, we may readily own that minds and ideas, like species, are no result of abrupt

creation, but the product of a long process of evolution. These men were as seeds that had lighted upon a fertile soil. The age was ripe for them. We shall not be unmindful of the brilliant company of their peers, a long procession extending from the past into the present, a glorious muster-roll, including such men as Harvey and Redi, Ray and Réaumur, Pallas and Humboldt, Savigny and Lamarck, De Candolle and Milne-Edwards, Playfair and Barrande, Sedgwick and Lyell, Owen and Huxley, with others too numerous now to mention, all of whom have passed away, but have obligingly left for our benefit inheritors of their inexhaustible industry, their skill in controversy, their lucidity of style, their penetrating insight, and other enlivening gifts of genius.

Auxiliary to the wits of the naturalists, and giving the modern period a substantial advantage over earlier ages, there have been a series of triumphs won by other men's wits, for other purposes and in other domains. Carry back your minds to the almost unthinkable time when printing was unknown, when as yet there was no post office and no freedom of the press, when paper was costly, and when men had to do their travelling without steamers and without railways. You will see that under those conditions naturalists were almost as helpless as monkeys, elephants, dogs, and other sagacious animals which are kept at a low level of civilization because their means of communicating and keeping on record bright and improving ideas are so extremely imperfect.

Work of astonishing accuracy has no doubt often been done by lovers of nature with very simple apparatus, but the modern student will not disown his indebtedness to the perfection of modern appliances, and especially to the improvements in the microscope. These, or rather those who devise them, have progressively been making research more easy, more fruitful, more attractive. The wonder of the thing appeals not only to the man with a purpose, but to the man without one, and in the exaltation of science the concurrence of the idle, the leisurely, the contemplative, is not to be despised. From the law court and the camp, from the ledger and the counting house, men turn sometimes for amusement's sake to Natural History. They find it a delightful and absorbing pastime. That in itself is something. But, though the original motive may have been "to treat an idle subject in

an idle manner," the original motive will often be outgrown. In the use of the microscope one thing is very likely to happen. A curious sensation of shame will steal over an observer when he becomes conscious that what is really ridiculously small is not the animal or plant which he is handling, but his own knowledge of its functions and powers and organization. This very feeling, however, will give him an assurance that he has an endowment for life in things strange and beautiful to be observed and studied. Nature is prodigal, and in the hope of rearing a couple of sprats will produce five thousand eggs, and more than half a million for a couple of flounders. We need not then be surprised if many hundreds or thousands of observers are used up in unproductive labour or self-amusement for every true light of science that shines upon a generation. Yet the laborious accumulation of knowledge by very humble workers may ultimately be of service to mankind. Thus Gilbert White of Selborne not improbably traces the extirpation of leprosy from this part of the globe to the improved knowledge and therewith the greatly extended use of vegetables. So happy a result could never have been foreseen by the botanists who trifled away their unremembered lives in studying kales and carrots and "sweet smallage."

It is commonly supposed that the advance of science has been greatly hindered by the persistent and often recurring opposition of theologians. That may be true of the middle ages, but of the last century and our own it is extremely doubtful. The new views on the age of the earth, on the antiquity of man, on the transmutation of species, severally in their turn aroused, it is true, the most violent hostility. The evidence adduced crashed in among accepted beliefs like the bomb of a nihilist. Denunciation and ridicule were freely employed against the new opinions. The "conspiracy of silence" was adopted wherever it could be made effective. The social discouragements, which we all more or less unconsciously apply to those whose opinions we dislike, were no doubt brought to bear as remorselessly as ever upon the happiness and prosperity of many outspoken geologists and evolutionists. But the very fierceness of the controversies helped to arouse attention and keep it awake. Besides, the age was an age in which freedom had found her voice, and the country in which

the controversy began was the sworn lover of freedom. Hence it came about that Geology, the science which deals not in warm life and lovely colours, but in mud and stones and bones and old refuse, obtained a predominance and a publicity which it could not otherwise easily have secured. Persons of candid mind would naturally wish to hear both sides of an exciting question. Persons of pre-occupied mind would still sometimes wish to see for themselves what nonsense the geologists were writing. Of course it was foolish of them, for if a man has made up what he calls his mind he ought never to hear the other side. But anyhow, through wisdom or through folly, by degrees the light of truth was enabled to penetrate some of the darkest corners of prejudice, and the process still continues.

For truth to win any lasting and valuable victory, it is essential that contradictory opinions should be brought face to face. Facts so opposed that they cannot be true together should be confronted one with another, and the antagonism of each to each made manifest and expressly declared. Now, the men of science, with rare exceptions, make no claim from the scientific point of view to know what goes on in Heaven or in Hades; but, as I understand the matter, they are modestly certain that our globe has lasted for hundreds of thousands of years; that within the human period the whole of its surface has never been submerged at once; that no human being ever lived to the age of nine hundred years; that the human species began quite otherwise than with an abruptly created pair; that no woman was ever formed of a rib taken from the side of a man; that no serpent ever spoke with human voice to tempt a woman, or for any other purpose; that no warrior, however noble or sacred his cause, ever stayed for a single instant the cosmical motion of earth, or moon, or sun; that the rainbow has exhibited the colours of the solar spectrum to living eyes capable of perceiving them in absolute independence of any terrestrial inundation, past or future; and that the diversity of human languages, due to causes still in operation, has been the result of gradual divergence, not of any sudden supernatural intervention. But again, as I understand the matter, a large body of our pastors and masters, of men who have a prescriptive right and a splendid vantage-ground for teaching morality and religion, deny in these respects what the

men of science affirm, and affirm what they deny, or else they ignore the matter, or else they are ignorant of the points in dispute and take no interest in them. But the fact is that no one can stop the revolution of the earth by simply saying that it does not move, and no teacher can influence his disciples if in his argument he pre-supposes as accepted and impregnable truth what they, rightly or wrongly, regard as incredible legends.

If even opposition has promoted the knowledge of nature, much more must the innumerable societies established expressly for its promotion have been efficacious. The growing appreciation of science led to their being founded. Their foundation has led to an ever-extending growth in the appreciation of science. Much the same may be said of periodical scientific literature, although that is a subject almost too mountainous, too labyrinthine to enter upon just now. So, too, it is impossible here to make more than a passing allusion to the celebrated Marine Biological Station at Naples, established five and twenty years ago by Dr. Anton Dohrn, with results, direct and indirect, of far-reaching value. For my immediate purpose it may suffice to speak of the British Association. It was founded, as most of you know, in 1831. It is a missionary organization, a peripatetic school of philosophers. While most societies are like ordinary vegetables, rooted to the soil, this has the superior characteristic of an animal, as being capable of free movement. It can flit from Aberdeen to Oxford, from Glasgow to Plymouth, and from Plymouth to Dublin. It can wing its way from Liverpool to Toronto, from Toronto to Bristol, and then leaving "The Queen of the West," pitch its camp, as we confidently expect, the year after next, in Dover. It has brought the wonders and surprises of advancing knowledge to men's own doors. It beats the drum outside their windows, so that they cannot altogether shut their ears to the music. The reception of it entails upon the hospitable town an astonishing amount of trouble and expense. Nevertheless the welcome it receives is not only everywhere extremely cordial, but the pleasant sight is witnessed of rival towns or cities competing for the honour of giving it entertainment. What this parent association does on an imperial scale, our Union hopes to do for a limited area, not by inopportune mimicry, but by judicious following of a great example.

That the British Association is broken up into sections, designated by letters of the alphabet, from A to K, is due to the enormous extension of modern science, which makes division of labour a matter not of choice but of necessity. Each section is an association in itself. Each is fully, and sometimes more than fully, occupied with its committees and reports, and papers and discussions and recommendations. Our own energetic honorary secretary, Dr. Abbott, has printed on the back of your tickets a list of thirteen departments of scientific investigation in which he invites you to take an active part for the benefit of our Union and Congress. He does not pretend that the list is exhaustive, and in fact he does not mention either Bryology or Embryology or Bryozoology; he has omitted Mycology and Malacology and Carcinology; he has steered clear of Morphology and Physiology and Seismology, of Zoogeography and Phytogeography and Crystallography; he says nothing about plankton or nekton or benthos, and he saves his credit, as I must do mine, by alluding to all the rest as "allied subjects." This at least is patent, that of subjects there is no dearth, but no one can any longer hope to be a specialist in all of them or in many. To know everything about something or something about everything is becoming increasingly difficult. Every one recognises the intellectual danger of extreme specializing, of working too exclusively in a single groove, but the modern hermit no longer sighs for—

" The hairy gown and mossy cell,
Where [he] may sit and rightly spell
Of every star that heaven doth shew
And every herb that sips the dew."

Thoroughgoing astronomy by night and thoroughgoing botany by day are no longer so readily combined as they may have been in Milton's time. The force of circumstances is making it ever less and less easy to induce the man who is investigating the properties of helium or studying the corona of the sun to sympathise with the other man who is carrying on researches into the genealogy of a centipede or the domestic economy of a cockroach.

Nevertheless, through the marvellous unity of Nature—that unrivalled argument for the oneness of a Divine Author of it—

there seem to be no branches of knowledge so remote and unconnected that they cannot upon occasion benignantly illumine each the other. Therefore a Congress like ours aims at bringing together men engaged on different lines of research, that from time to time and in a measure all may understand what all are doing. It aims also at bringing together men pursuing the same line, that they may learn from one another the best methods and the best results. It aims at bringing together those who are willing to learn that the men of long practice and mature counsel may explain to the inexperienced, and to beginners full of youthful vigour and energy, what is worth observing and how to observe it. The object of our Union is to win for science such benefits as are found to accrue in manufactures from division of labour, and in trade, commerce, and finance from co-operation. We think that the good work which is being done by numerous local societies in isolation will be better done if they are brought into sympathetic contact and join hand to hand in unselfish brotherhood.

The present Union is not the first of its kind. In this world, as we know it, nothing ever is the first of its kind. To ourselves there is this advantage, that we can explain our hopes and purposes by reference to valuable work already done elsewhere. For instance, the important and long-established Yorkshire Naturalists' Union, besides having monthly summer excursions, and an annual congress and an annual subscription, issues transactions, publishes a monthly journal, and maintains a library. It is divided into sections, with their several presidents and secretaries, and it has a great many committees of research, of research connected with the great county from which it is named. *Mutatis mutandis*, the sort of work which we hope to do may be inferred from the list of these Yorkshire committees—the boulder committee, the coast erosion committee, the fossil flora committee, the geological photographs committee, the marine zoology committee, the micro-zoology and micro-botany committee, the wild birds' eggs committee, and the mycological committee. Another suggestive indication may be borrowed from the proposal for a photographic survey of Devon, made to the Devonshire Association by Mr. C. E. Robinson. He says: "The subjects for inclusion in the survey might comprise the following:—

"Churches, monuments, tombs, castles, old houses, bridges, streets, ruins, historic documents, coins, paintings, carvings, very old people.

"Celebrated trees, loggan stones, rocks, caves, geological sections.

"Effects of lightning, storme, floods, landslips, earthquakes, &c.

"Rare birds, beasts, fishes, plants, and fossils, remains of pre-historic men and animals."

The work pleading to be done is, in fact, so overwhelmingly extensive that it may be refreshing to hear of some work pleading to be not done. For fostering a love of natural history, the ideal method long practised was to encourage young people, and beginners in general, to make collections of eggs and birds, of butterflies and beetles, of flowers and fossils. It still remains absolutely essential that a student should have materials for his study. But the enormous increase in the number of collectors, often having only a commercial or other quite unscientific object in view, has made it necessary for the lovers of nature to protest loudly against rapacity and ravage. Of some butterflies it has been lately said that "their extinction will only be checked by the extinction of 'the mere collector' and the dealer who supplies him." As for eggs and birds, that zeal for rare specimens which, in a former age, would have qualified a man to be president of a learned society, is now more likely to subject him to prosecutions and penalties. That is, perhaps, for us the necessary way of forming a healthy public opinion, just as our ancestors thought that scourge and gibbet, rack and faggot, must be freely used to keep the social machine in order. Of course I know that revenge is sweet, and that it is delectable to bring others round to our way of thinking under compulsion. Still our Union will be content to produce the effect rather in a different manner, by spreading knowledge, by showing that it is for the common benefit and general happiness not to have the fauna and flora of the district devastated, and by gradually persuading the spirit of the age that things rare and strange and beautiful, when open to all, should be under the protection of all, and should be appropriated only for legitimate use, and not sacrificed to greediness or vanity.

One other point must be mentioned, which concerns the

literature of science. Professor Flinders Petrie lately used a memorable expression, that this age is drunk with writing. Anyone who has tried to light a fire will know that when too much paper is used in the kindling, the flame is extinguished by its own smoke. From these metaphors you may understand the risk to which scientific truth is exposed of being disabled and smothered by the multitude of its exponents. Observations must be recorded. Writers can only attain efficiency by reiterated efforts. But it is not necessary that every beginner's essays, every crude attempt at research, every uncompleted investigation, every reproduction of the obvious and the commonplace, should be printed and published. Those who are engaged in bibliography, classification, and monographic work of every kind, however free they may be from critical cynicism, cannot close their eyes to the difference of merit in the writers whose works they are obliged to examine. The difference often ranges from supreme excellence to detestable badness. By publishing what is old as though it were new; by incomplete, inaccurate, confused and misleading descriptions of what is really new; by hypotheses based on easily avoidable ignorance, authors win themselves no honour, and they grievously trouble science. Those, too, do an injury to themselves and their neighbours who, out of carelessness, or out of self-will, or out of superfluous modesty, use irregular, unrecognised, and obscure means of publication for discoveries that are valuable and good.

Our Union will have justified its existence if it can persuade its members and all who come within the sphere of its influence to put mischief and destructiveness out of countenance, to discourage the diffusion of useless knowledge, to bring loyal effort and arduous exertion in the service of truth into prominence and the full light of day.

More I shall forbear to tell you anent the wisdom and the profit of all that we wish to do and to do not; remembering how even the eager and enquiring Queen of Sheba, on her visit to the Hebrew Linnaeus, was so tired out with all that she heard and saw that there was no more spirit in her. Only to timid and hesitating beginners I may venture to say one concluding word. Believe me, that ever as you pursue your path through the fairy-land of science, and become more and more acquainted with the

riches and splendour of the scene, you will more and more be convinced that the fame of it has not exceeded the reality, that at your outsetting the half was not told you. If you feel that ignorance and superstition cannot be the proper pillars to uphold the welfare of the world and support the throne of God, if you agree with the Swedish Linnæus that without knowledge of the Universe, so far as it lies within our ken, neither filial reverence nor due gratitude can be intelligently offered to its author, you will see that Nature is given as the dominant instructor of mankind, you will think of its students as nobles round a king, and will be disposed to say to their sovereign as the Queen of Sheba said to Solomon, "Happy are thy men, happy are these thy servants which stand continually before thee and hear thy wisdom." It is open to all men to join their company and to share their felicity.

OBITUARY.

JOHANN JAPETUS SIMON STEENSTRUP.

THE death is announced at Copenhagen of Dr. Steenstrup, formerly Professor of Zoology at the University of Copenhagen and Director of the Museum of that city. Dr. Steenstrup was born in 1813, and had thus reached the eighty-fifth year of his life. He published much on Natural History, but he will be principally remembered by his work on the subject of "Alternation of Generations." Our best course is to quote Geddes and Thomson on this point. "The progress of marine zoology and the study of parasitic worms gave naturalists like Sars, Dalyell, Lovén, Von Siebold, and Leuckart early glimpses of many alternations in life-history, but Steenstrup was the first to generalise the results. This he did (1842) some twenty years after Chamisso, in a work entitled 'On the Alternation of Generations; or, the Propagation and Development of Animals through Alternate Generations, a peculiar form of fostering the young in the lower classes of animals.' In 1849, Owen submitted this essay to stern criticism, and subsequently "the labours of some of the foremost naturalists have both extended Steenstrup's observations and rendered them more precise."

The late Professor also studied the prehistoric remains found in his own country, both as regards fauna and flora, and in 1866, in conjunction with Sir John Lubbock, contributed a memoir to the Ethnological Society of London "On the Flint Implements recently discovered at Persigny-le-Grand." He was appointed to his zoological Professorship and Museum Directorship in 1845, previous to which he had acted as Lecturer on Mineralogy at Soroe. In 1885 he retired into private life.

NOTES AND QUERIES.

MAMMALIA.

CHIROPTERA.

Daubenton's Bat on the Derbyshire and Staffordshire Border.—Daubenton's Bat frequents the river Dove in some numbers at the spot where it is crossed by the Derby road, near Uttoxeter. The mill-dam below the bridge and the fringe of willows and alders on the banks furnish a quiet shaded pool such as this species haunts by preference. In the early part of June I had several opportunities of watching the Bats late in the evening as they flitted in their characteristic fashion across the shadows just above the surface of the stream. This species and the Whiskered Bat, unlike the noisy Noctule and Pipistrelle, appear to feed in silence. I have never heard either of them utter a note when on the wing.—CHAS. OLDHAM (Sale).

Daubenton's Bat in Bedfordshire.—Whilst recently visiting Bedford I noticed that this little species was plentiful over the river along the promenade. By their habit of always keeping within a few inches of the water and circling about in limited areas these Bats can be easily recognized. I have previously recorded this species from another locality in the county, and it would undoubtedly be found a common one if those interested cared to seek in other parts of Bedfordshire for it. It is common at Southhill, over the lake in the park, where I have recently seen it.—J. STEELE ELLIOTT (Dixon's Green, Dudley).

Habitat of Ametrida minor.—A specimen of this rare Bat was recently presented to me. It was captured in November, 1896, in a house at Manaos, a town on the Amazons, about 1000 miles above Para. The measurements being rather less than those given by Dobson for *Ametrida centurio*, I sent it to Mr. Oldfield Thomas, who pronounced it to be *A. minor*, a species described from a single unlocalized specimen.—T. A. COWARD (Bowdon).

INSECTIVORA.

Lesser Shrew in Anglesea.—On June 11th we obtained about thirty pellets from the roosting-place of a Barn Owl, among some ivy overhanging the cliff in a small cove near Rhos Neigir, a few feet above high-water

mark. The bird flew out while we were collecting the pellets. On examination of the contents we found two skulls of the Lesser Shrew, *Sorex minutus*, and, as this is probably the first time this animal has been noticed in Anglesea, it is worth recording. The pellets also contained remains of the following:—One young Rabbit, *Lepus cuniculus*; four Rats, *Mus decumanus*; seven Mice, *M. musculus*; ten Long-tailed Field Mice, *M. sylvaticus*; six Water Voles, *Microtus amphibius*; twelve Field Voles, *M. agrestis*; two Water Shrews, *Crossopus fodiens*; nineteen Common Shrews, *Sorex vulgaris*; four small birds; and the elytra of five beetles, *Melolontha* and *Geotrupes*.—T. A. COWARD (Bowdon).

CARNIVORA.

Pine Marten in the County Waterford.—I was much interested in Mr. A. Heneage Cock's note (*ante*, p. 270), and now write to say that I have had the pleasure of seeing for the first time, alive and in a state of nature, a fine Pine Marten. On the 21st of this month (June) I was walking through the beautiful woods of Curraghmore, which adjoin Coolfin, when I heard a regular uproar by birds. It came from a spot a hundred yards or so away. Walking in the direction as quietly as possible, I expected to see a Fox carrying off a young bird. Among the branches of some low oaks was a large party of Blackbirds; one of them, a fine cock with bright orange bill, being greatly excited, scolding away at the top of his voice, and with outspread wings facing a point from which he expected trouble for himself and family; and there among the leaves, lying close along a branch, was a Marten, crouching low as if he was going to spring. It was a most interesting sight, and neither the Marten nor birds seemed to pay much attention to me as I watched them. Nothing can exceed the gracefulness and quickness of movement in the Marten. It twists and turns its lithe and supple body in every direction, and with wonderful rapidity. One must see it in a state of nature to appreciate what a deadly foe it must be to birds both old and young. Having watched them for some time I went away, and on my return both Marten and birds had disappeared. He was probably having his supper on the old cock, or a younger member of the family.—WILLIAM W. FLEMING (Coolfin, Portlaw, Co. Waterford).

Albino Badger in Hants.—On Feb. 9th of this year a Badger was caught near Basingstoke, exhibiting the following curious form of variation. The fur is quite white except at the tail, which is reddish brown; the eyes are pink, a feature correlated to albinism. The animal is mature, and a fine specimen; it is in the possession of Mr. Spriggs, of the Royal Hotel, Winchester, who will be glad to show it to anyone who wishes to see it.—G. W. SMITH (College, Winchester).

RODENTIA.

Bank Vole in Denbighshire.—As little appears to be known of the distribution of the Bank Vole in Wales, it may be well to record its occurrence at Colwyn Bay. Early in May last I trapped two in a roadside hedge on the borders of the Pwllycrochon Woods. Colwyn Bay is in an isolated portion of Carnarvonshire, but for distributional purposes should be considered as part of Denbighshire.—CHAS. OLDHAM (Sale).

Black Rat in Bedfordshire.—I was recently shown, by Mr. Wright, taxidermist, of Clifton, two Black Rats, *Mus råttus* (male and female), which he received on Dec. 9th last. Mr. Bowman, to whom they belong, informs me that they were caught at Stotfold, near Shefford, and that he believes there are still a few left in that locality, one or two having been previously taken. I should be pleased to hear of any additional information respecting this Rat in that locality or other parts of the country.—J. STEELE ELLIOTT Dixon's Green, Dudley.

AVES.

Honey Buzzard in Staffordshire.—I should like to suggest, in the interests of our rapidly vanishing Accipitres, that idiotic and wanton massacres such as from time to time are recorded in the 'The Zoologist' and elsewhere as having taken place on this, that, or some other estate, should be promptly, when possible, brought to the notice of the proprietors of such estates. The present generation of country squires are not without an intelligent appreciation of what tends so immeasurably to the varied natural attractions of their woodlands, and a continuance of the senseless slaughter by ignorant and irresponsible keepers of Common and Honey Buzzards, Kites, and Hobbies—not to mention the more familiar Kestrels—would in many instances doubtless receive a very summary check could those in authority be made acquainted with the murderous proclivities of their underlings the moment they espied a rare and harmless bird upon their beat. To quote a case in point: in the October number of 'The Zoologist' for 1895 was recorded the attempt of a pair of Honey Buzzards to breed during the summer of that year at Bishopswood, in Herefordshire. The nest was found, the eggs taken, and both birds fell victims to an undiscerning keeper's gun. Mr. Harry M'Calmont, the owner of Bishopswood, happened to be a friend of mine, and I at once notified him of the occurrence, of which he knew *nothing* until the receipt of my letter. The upshot of my mediation resulted in the keepers at Bishopswood receiving strict injunctions to henceforward protect and preserve all the rarer Accipitres seeking to establish homes on the estate. The communication from Mr. E. Baylis in the May issue (p. 232) of 'The Zoologist' has reawakened my active sympathies for a beautiful, inoffensive, yet much persecuted

species; one, too, which most field-naturalists will ever sentimentally associate with Selborne Hanger and Gilbert White.—H. S. DAVENPORT (Ormandyne, Melton Mowbray).

Little Owl near Newark-on-Trent.—A bird of this species was shot at the above locality in September, 1896. The late Lord Lilford turned out a number of these birds in Northamptonshire, but this, the first recorded occurrence in Notts, is worthy of mention.—F. WHITAKER (Rainsworth, Notts).

Hybrids in St. Stephen's Green Park, Dublin.—We have at present a brood of hybrids between a male Ruddy Sheldrake, *Tadorna casarca*, and a female Egyptian Goose, *Chenalopex aegyptiaca*. In shape they are decidedly like the Goose, having long legs and depth of bill, but in colour the Sheldrake shows out unmistakably. Some years since a brood of hybrids between the Paradise Sheldrake of Australia (male) and a Ruddy Sheldrake (female) were hatched out, producing a lot of exceedingly handsome birds, in which a rich mahogany-brown was the predominant colour; the top of the head being pure white. This year one of these birds, a male, has bred with a female Ruddy Sheldrake, having a brood of six. At present they are not old enough to exhibit the colours distinctly. There is another curious cross—Bar-headed Goose and White-faced Bernacle; but both birds are so mixed up in the plumage that they are certainly anything but handsome. The White-faced Bernacle bred two years ago, but from some cause forsook the nest. The eggs were then placed in a Sevastopol Goose's nest, and were hatched out and reared successfully. Ever since they have been inseparable companions of their foster-parents.—E. WILLIAMS (2, Dame Street, Dublin).

Scaup inland in Lancashire.—Late in November or early in December, about five years ago, Mr. George Parker shot a Scaup on the reservoir near Hyde Road Station, on the outskirts of Manchester. The bird, which Mr. Parker has kindly allowed me to examine, is a female or an immature male.—CHAS. OLDHAM (Sale).

Night Heron in Derbyshire.—I have recently had an opportunity of examining a Night Heron in adult plumage, which was shot by the late Mr. William Jackson at Coombs Reservoir, a large sheet of water near Chapel-eu-le-Frith, some time in the early sixties. This species has not, I believe, been previously recorded for Derbyshire.—CHAS. OLDHAM (Sale).

Black Tern in Anglesea.—On June 10th, Mr. T. A. Coward and myself watched a Black Tern for some time on one of the lakes near Valley. The bird flew leisurely to and fro at a slight elevation, making frequent stoops to take food from the surface of the water, on which it once alighted for an

instant. At intervals of a few minutes it returned to rest on a small bank of pebbles a few yards from the shore, from which it had taken flight on our approach.—CHAS. OLDHAM (Sale).

Black Terns in Warwickshire.—During the afternoon of May 16th two Black Terns, *Hydrochelidon nigra*, were seen over Bracebridge Pool, Sutton Coldfield, and in the evening I found them again at Powell's Pool, in company with some hundreds of Sand Martins, hawking flies over the water. By their graceful movements and activity they seem in this pursuit as equally adept as the latter. They had disappeared the following morning. This makes the fourth recorded occurrence of this bird on these pools.—J. STEELE ELLIOTT (Dixon's Green, Dudley).

Occurrence of a rare Plover, *Charadrius dominicus*, on the River Thames.—On August 6th, 1896, I shot a small Golden Plover off Shell Haven Point, opposite Hole Haven (River Thames), which I sent at once for preservation to Mr. Cook, taxidermist, of 31, Lower Road, Rotherhithe. I recently took it to the British Museum (South Kensington), where it was instantly identified as the Asiatic species, *Charadrius dominicus*. As this bird is, I believe, of very rare occurrence in this country, I thought the record might prove of interest to your readers. It can be seen at any time at my address, and I shall be happy to afford any of your readers further information as to where and how it was shot. I may add in corroboration that a friend, Mr. Herrtage, of the firm of Smith and Herrtage, 22, New North Road, City Road, was with me when I shot the bird, and he got out of the punt and picked it up.—H. NUNN (5, Spurrow Corner, Minories).

Memory for Locality in a Nightjar.—During the summer of 1894 I more than once flushed a cock Nightjar from a certain rock among some gorse on a hill about nine miles from here. One day, with the hope of seeing the bird before it flew, I approached cautiously, and was rewarded by seeing it squatting on the rock, and at a distance of only a few yards. The bird's plumage harmonized so well with the rock that it was not only difficult to see at first, but also required a good deal of directing to show it to friends I had with me. This is now the fourth summer in which the Nightjar has regularly occupied the same spot during the daytime, for I found it there as usual on June 12th. I feel sure it must be the same bird, for it is always in exactly the same place; and I take friends with full confidence that it will be there.—HERBERT C. PLAYNE (Clifton College).

Blackbird stealing Eggs.—While sitting by the side of one of the numerous small streams near here on May 20th, watching a Dipper diving in a small pool, and securing food for its young, which were in a nest in an old water-wheel close at hand, I was suddenly attracted by a noise a little

urther up stream, where a hen Chaffinch was sitting on her nest in the fork of an alder. On creeping up behind a big boulder, to within about five yards of the nest, I saw a cock Blackbird, *Turdus merula*, which had made his way to the nest,—in spite of being mobbed by the cock Chaffinch,—peck at the hen-bird till she flew off, and, deliberately picking up an egg in his bill, fly away with it. I was so astonished that I jumped up the bank to try and mark him down, and see what he was going to do with the egg, but unfortunately he entered a small but dense plantation, where I lost all trace of him, and could find no Blackbird's nest with young or eggs. I wish now I had waited to see if he came back for more. I visited the Chaffinch's nest two days afterwards, and the eggs were all gone, but whether taken by the marauding Blackbird I cannot say.—OXLEY GRABHAM (Heathwold, Goathland).

The Voices of the Blackbird and the Nightingale compared.—There are some slight traces of generic vocal resemblance between these two birds. The Blackbird's rattling alarm, it is true, is widely distinct from the croak of the Nightingale; but the latter exclamation is sometimes spread out, as it were, in a succession of ticking sounds, reminding one of the "lit it it" cry of the Robin, the more simple rattling alarms of the Blackbird, and the rapid "chick ik ik" alarm of the Whitethroat. The Nightingale employs these clicking notes especially towards the young, to whom a single "tick" appears to be addressed as a parental hush. The connection between these sharp sounds and the croak is obvious, for often an exclamation begins with the croak, and merges into a succession of ticks. Similarly the Robin has the habit of beginning the "lit it it" alarm very quickly, and ending slowly. Another note, apparently an alarm, which I have heard (I think) from the female Nightingale, is a single, short, full whistle, closely like the "quip" alarm of Blackbird and Redwing. I have also heard a Nightingale near its young utter a long high "distress note"—practically the same as the high "distress note" of the Robin; and Dr. A. G. Butler informs me that he has heard the same note in the Nightingale. It has also a simple short squeak, closely like the call of the Robin, but less like the call of the Blackbird. When living at Stroud, I had some difficulty in observing the Nightingale, which was not common there. One day I followed a family party of two old ones and three young, in a thicket, and watched the feeding of the young, having often a very clear view of the whole operation. It was then that I came to the conclusion that the cry of the young Nightingale was practically identical with that of the young Blackbird of the same age, and I so stated my opinion ('Evolution of Bird-Song,' p. 103). Near Eltham I have observed many young Nightingales, and I find that their cry is not like that of the young Blackbird. In making my former observations I must have been misled by

the notes of some young Blackbirds in the surrounding bushes ; but as there is so little variation in the cries of the young of any species, I felt justified in describing the note of the young of a species from the observation of only one family of nestlings. It is curious that while the songs of the Blackbird and Nightingale are so dissimilar, several of the strains of the latter have the same intervals of pitch, and practically the same rhythm, as some of the more elaborate rattling alarms of the former. Often have I heard a Nightingale sing a phrase which if heard in winter, at a distance, would be easily mistaken for a Blackbird's alarm. — CHARLES A. WITCHELL (Eltham, Kent).

Nightingale near Scarborough.—In 'The Zoologist,' 1896, p. 304, Mr. W. J. Clarke records a Nightingale near Scarborough in the summer of that year. This year, in the second week of June, I saw a Nightingale within two miles of Filey, in a thicket near the roadside, with a caterpillar in its beak, and within a few feet—a bird of the year. The range, however, of this species is now recognized as extending to the extreme north of England, and Mr. Bolam, of Berwick-on-Tweed, records an undoubted instance of its occurrence, in the 'Annals of Scottish Natural History,' in Northumberland, near Callaby Castle, in the summer of 1893.—JOHN CORDEAUX (Great Cotes House, Lincoln).

Icterine Warbler at Lyme Regis.—While staying at Lyme Regis during this last May, I several times heard and identified the beautiful song of the Icterine Warbler, *Hypolais icterina*, in the wooded undercliff at Ware, about a mile to the west of the town, and well within the Devon boundary. I heard the bird first on May 4th ; it was singing in a large whitethorn, quite in the centre of the bush, and although I waited for some time with the bird singing away within a few feet of my head, it did not come into view. The next time I heard it was on the 15th. It was in the same bush, and again would not show itself. On this occasion I was accompanied by a friend, who exclaimed, "How delightfully that Nightingale is singing !" but I was able to point out to him the differences between the trills of the Nightingale and the clear Thrush-like notes we were listening to. On the 17th the bird was heard singing from the same bush by my wife, who is well acquainted with the song of the Icterine Warbler ; a keen N.E. wind then set in, stilling all bird-song, and, although I revisited the spot several times, I did not hear the bird again. I may add that on May 4th I heard a second Icterine Warbler singing, also in the centre of a dense whitethorn, about a quarter of a mile away from where I heard the first. I call this Warbler the Icterine Warbler, although the Melodious Warbler, *Hypolais polyglotta*, is the western representative of *Hypolais*, and therefore the one most likely to visit our southern shores.

Still, the song I heard was certainly that of the Icterine Warbler. There can be no doubt that this bird is a regular summer visitor to this country, only requiring those acquainted with its song to identify its presence.—
MURRAY A. MATHEW (Vicarage, Buckland Dinham, Frome).

Rare Warblers in Sussex.—On May 1st last two Warblers, male and female, were sent to Mr. Bristow, of St. Leonards, for preservation, from Burwash, in Sussex. The female, which turned out to be *Hypolais icterina*, I exhibited at the May Meeting of the British Ornithologists' Club. The male I did not have an opportunity of seeing till to-day (June 24th), and on comparing it with the female I was struck by its relative shortness of wing. I then examined them more closely, and found that in the female (*H. icterina*) the first primary was just shorter than the primary coverts, and the second intermediate in length between the fourth and fifth; whereas in the male the first primary was longer than the primary coverts, and the second intermediate in length between the sixth and seventh, the third, fourth, and fifth forming the tip of the wing. This, I see, is just the difference given by Herr Gätke between *H. icterina* and *H. polyglotta*. It is curious that these two birds, male and female, should have been shot on the same day and at the same place, and a pity that in May they should not be safe from persecution.—A. F. TICEHURST (Guy's Hospital, S.E.).

Variety of Grasshopper Warbler.—On July 10th, 1892, Daws, the taxidermist at Mansfield, and a friend, were seeking butterflies near Mansfield, and when beating some sedges on a brook-side a small bird flew up, which Daws caught in his net. This proved to be a variety of the Grasshopper Warbler, and as it is the only variety of which I have ever heard, think it, though so far back, as worth mentioning in 'The Zoologist.' The plumage is paler than usual; the first two flight-feathers in right wing are white, as are the first four in the left; there are also a few small white feathers over the flights. Daws most kindly gave me the specimen, which I value as a very rare variety.—F. WHITAKER (Rainsworth, Notts).

Variations of Habit in the Blue Titmouse.—In 'The Zoologist' for 1896 (p. 108), I recorded the unusual habit of a Blue Tit in soaring on motionless wings from perch to perch. I afterwards saw this bird often, and this year it exhibited exactly the same behaviour. On one occasion it rose from the top of an oak, and then sailed along, in the manner of a Tree Pipit, to the top of a lower tree. The best "sail" it executed was when passing over a road to the lamp-post in which its nest was afterwards built; it was going against the wind, and seemed to creep along the air in a charming manner, and was closely followed by another Tit, to which it had been addressing ardent call-notes. The Blue Tits here nest in the lamp-posts. The lamplighter tells me they all rear their young, and I

lately heard the cry of a young one from the top of a lamp-post, and several others, just able to fly, were around the spot. An old Tit occupies about a minute in descending and re-ascending a lamp-post, and probably it proceeds by rapidly hopping from side to side; there is not enough room for the spreading of its wings.—CHARLES A. WITCHELL (Eltham, Kent).

Red-backed Shrike near Rainworth.—I saw one of these birds in a garden near the village here, and sent my son up to look for the nest, which he soon found. In it there were five eggs. This is the first time this bird's nest has been found in these parts, but not first in the south part of the county, though it is far from common there.—F. WHITAKER (Rainworth, Notts.)

A probable Second Brood of Starlings.—In Yarrell's 'British Birds,' 4th edition, vol. ii. p. 234, it is stated respecting the Starling that "occasionally the same hole may be tenanted twice in the season; but such an occurrence seems to be very rare in this country." A pair of these birds had a nest this spring under the eaves of a house close to this. The young appeared in the gardens about three weeks ago, but for fully the last ten days they have ceased to be fed by the parents. These latter are now (June 13th) busily engaged in carrying nest materials to the spot where the old nest was situated. A quantity of bean-sticks in my garden, which were put in the ground scarcely a week ago, have already been nearly decorticated by the birds. I look forward with interest to the advent of the second brood.—R. McLACHLAN (23, Clarendon Road, Lewisham).

[As we go to press, Mr. McLachlan informs us that the young of the second brood have appeared and are out of the nest.—ED.]

Unusual Position for the Eggs of the Starling, Song Thrush, and Sparrow.—While staying in Gloucestershire last April, I was surprised at finding the eggs of several birds, namely, the Starling, Song Thrush, and Sparrow, laid on the ground. I was walking in a field one day, when I found a Starling's egg on the grass. About twenty yards from the spot was a tree in which I knew some Starlings had a nest. I turned round and began to walk to the tree, in order to pace the distance, when I found another egg, also a Starling's, about five feet from the first. They were both uninjured, and, on blowing, proved to be fresh. About three weeks afterwards I climbed the tree, and found the nest in a hole. It contained two young ones. The fact of there only being two seems to prove that the eggs on the ground were laid by the owner of the nest. About an hour after finding the Starling's eggs I startled a Thrush from under a hedge in the same field, and on looking found a Thrush's egg on the ground. In the hedge just above the egg was an empty Thrush's nest. A week after

this a friend found another Thrush's egg on the ground in a field, and I myself found a new-laid Sparrow's egg in the middle of a tennis-court. It seems to me that the most probable reason for eggs being laid on the ground is either that the bird has been disturbed while in the act of laying, and has been obliged to lay the egg before it was able to get back to the nest, or that the bird has deserted its nest when it has only laid, say, two eggs, and has been obliged to lay the remaining three (in the case of its laying five) somewhere outside the nest. Are not these cases rather unusual?—
BERNARD RIVIÈRE (Flaxley, 82, Finchley Road, N.W.).

The Song of the Greenfinch.—I have stated, in 'The Evolution of Bird Song' (p. 126), that the "tewy" alarm (a slurred whistle) is never uttered in the song of the Greenfinch. I regret to say that this statement was inserted in the correction of the proof, and was made from memory, without reference to my notes. I find that the cry in question, the true danger-cry of the Greenfinch, is sometimes included in the song. Also, it is not always slurred upwards, but sometimes remains at the same pitch, when it much resembles a note given by the common Canary in the presence of a stranger. The Greenfinch employs the note in the presence of a Hawk, Cuckoo, Cat, Dog, or Weasel. One day last spring I heard a kind of rhythmical repetition of this note, it being alternately slurred upward and downward by some Greenfinch, so that the song seemed to run: "tewy tewoo, tewy tewoo, tewy tewoo," and so on. After listening to this for a minute I thought I had discovered a new strain in the Greenfinch, namely, one composed entirely of the danger-cry. On investigation I found a female Greenfinch, evidently disturbed, on the lower branch of an oak in the thicket. She was watching something below her; and soon a Cuckoo flew up, and, seeing me, went off. The notes of the Greenfinch immediately ceased, and were not renewed. On other occasions the single cry has been given when a Cuckoo was near.—CHARLES A. WITCHELL (Eltham, Kent).

Change of Plumage in the American Nonpareil Finch.—In answer to Mr. Graham Renshaw, my experience of examples of this species, which I have kept at various times, is that (when kept either in cage or aviary) abundance of insect-food retards the loss of colour, but does not prevent it. If but little insect-food is given, the crimson of the under parts disappears in patches, each moult leaving the bird with more yellow and less red in its plumage, until, by about the third or fourth moult, the red has wholly disappeared. If, after the under parts have become wholly yellow, the bird is removed to a sunny and well-ventilated aviary, and plenty of cockroaches are daily supplied in a "demon beetle-trap," so that the bird can freely help itself to as many as it requires, the plumage

becomes deeply tinted with orange at the following moult. I regret that, owing to the death of the bird with which I experimented at this stage, I am unable to say positively that perseverance in the same treatment would have completely restored the wild plumage; but it is quite reasonable to suppose that such would have been the case. I should judge that the gradual and uniform change of colouring from red to orange in Mr. Renshaw's bird was due to his giving it abundance of insect-food; similarly treated in a large sunny open-air aviary, it is probable that the typical colouring would have been retained.—A. G. BUTLER (124, Beckenham Road, Beckenham, Kent).

Nest of the Reed Bunting.—I found a nest of this species on the 2nd of this month (June) built in a somewhat unusual position. It was at the extreme edge of an osier-bed skirting a small tributary of the river Suir. The nest was built at the junction of two branches of willow, crossing each other, and was perfectly suspended, and overhung the water, from which it was distant $5\frac{1}{2}$ ft. I watched the hen for some time. She uttered occasionally a single note, and behaved quite differently to a pair of Lesser Redpolls which had a nest close by, and which were very noisy and excited. There were four young birds in the nest. They were apparently four or five days old, and the hen had her mouth full of small pieces of willow-leaves, which I saw her gather, evidently for the young. It was a very untidy nest, composed of moss and catkins of willow roughly put together.

—WILLIAM W. FLEMING (Coolfin, Portlaw, Co. Waterford).

Grey Wagtail Nesting in Lincolnshire.—When recording this in the last number of 'The Zoologist,' I forgot to mention that the nest was lined exclusively with *white cow-hair*, a material which appears to be invariably used by the Grey Wagtail. Also that within an hour of the young leaving the nest the old birds had succeeded in getting them to the nearest running water, about three hundred yards from their nesting place. — JOHN CORDEAUX (Great Cotes House, Lincoln).

Nesting of the Grey Wagtail in Leicestershire.—Mr. John Cordeaux always yields an attractive pen, but, so far as I personally am concerned, exceptional interest attaches to his note on the breeding of the Grey Wagtail in Lincolnshire—the first recorded instance for that county—as detailed in the June issue of 'The Zoologist.' Mr. Cordeaux, apart from the intrinsic interest of his narrative, has eloquently demonstrated the unwisdom of placing too much reliance on preconceived ideas; in other words, the mistake of assuming that because such and such a bird has never been known to breed in such and such a county, it is next door to impossible for it ever to do so. In 'The Vertebrate Animals of Leicestershire and

Rutland,' published in 1889, the author refers to the Grey Wagtail as follows:—"A winter migrant, sparingly distributed, *and not recorded as remaining to breed in the counties.*" The sentence italicised is wholly misleading and contrary to the fact. In the spring of 1878 I found the Grey Wagtail nesting in the bank of the Eye Brook, close to Skeffington Wood; the young were fledged by the end of the first week in May, and there was an addled egg left in the nest, on which, by the way, I one morning discovered the hen-bird sitting. This was the first verified instance of the species breeding in Leicestershire; yet, in spite of remonstrance, my note on the subject was discarded by the author of the work quoted above on the score that I must have mistaken the Yellow, or Ray's, for the Grey Wagtail! Nevertheless, apart from the fact that, according to my experience, Yellow Wagtails do not repair to the banks of streams for purposes of nidification, I should consider the end of the first week in May in any year an early date for a full clutch of eggs of this species (*vide Zool. 1896, p. 354*). I should add that the Curator of the Leicester Museum has since expressed regrets at having excluded—on no other grounds but those of unwarranted scepticism—a perfectly authenticated communication on a subject of interest to all scientific ornithologists in this midland county, he himself having chanced upon a pair of Grey Wagtails breeding within the last half-dozen years somewhere or other in the Loughborough district. It has been well said that seeing is believing! While recognizing and making full allowance for the difficulties encountered by compilers in sifting the wheat from the chaff when engaged in ornithological researches with a view to publication, and, at the same time, cordially approving of the judgment which prompts the suppression of the thousand and one notes which deal with the fancied identification of rare species here and there as they momentarily flit across the gaze of the observer, one cannot help regretting that duly authenticated discoveries, backed by "chapter and verse" and all the proof that can be considered needful, should be excluded from embodiment in what purposes to be the trustworthy history of a county's avifauna, and so lost to science. And my lament, too, is the more emphasized when I reflect that such exclusion is capable of being based upon what I can only designate as mere editorial caprice.—H. S. DAVENPORT (Ormandyne, Melton Mowbray).

White Wagtails in Warwickshire.—Amongst the many Pied Wagtails that visit the locality of Sutton Coldfield during their spring movements, I have for years been on the look-out for the White Wagtail, *Motacilla alba*, amongst their numbers. On May 2nd I was pleased to be able to identify a pair of these birds along the dams of Wyndley Pool, which were so tame as to allow me to advance within a few feet of them. Walking thence to Powell's Pool, another pair were noticed amongst a quantity of Pied

and Yellow Wagtails, which I believe were also these birds, but which were too wild to allow me to fully identify them by a nearer approach.—J. STEELE ELLIOTT (Dixon's Green, Dudley).

Avicultural Notes.—Canaries in my out-door aviary, at the autumn moult, had their yellow feathers almost obscured by long grey hairs; these are now shed, and they are their usual bright yellow colour, so that it would seem as if in the first year of turning out they revert back to nature in this respect also. Dr. Butler is clear, and I think evidently correct, in his article on Foreign Finches and their combative qualities in aviaries, notwithstanding some of our experiences may vary a little first one way or the other. In my own little experience, birds whose behaviour last year left nothing to be desired are this year quite pugnacious; therefore to be in a position to dogmatise one must, as Dr. Butler says in his opening statement, be an observer over a number of years.

I am much interested in the manner in which those birds whose summer and winter plumage is dissimilar assume their gaudy summer attire. In such birds as Chaffinches and other *Fringillidae*, whose plumage, though the same, is yet much brighter during the breeding-season, the result is brought about by the abrasion or wearing away of the fluffy hairs produced in the autumn moult; but this is not the case with such birds as Weavers, &c. Now, in the case of two Black-faced Weavers which I have successfully wintered in my garden aviary, during this change I have noticed all over the head, shoulders, neck, and breast—the principal parts affected—spines were produced so thickly as to resemble moulting; but there certainly was no moult, save with a few of the larger primaries. Can these spines be colour-glands? I much regretted that my aviary was so full, and with one or two pairs sitting it was not possible to catch them and make a close examination; but they are very tame, and by close observation I ascertained these facts. I shall certainly alter my arrangements and increase my specimens for next season, so as to ascertain fully and clearly the detail of the whole process. I believe myself that these spines (as I have called them) are produced in the quill of the existing feathers—visible, as before recorded, just before and while the change is taking place; and that these spines—or as I have called them colour-glands—bursting, the transformation is brought about, or else a new feather is almost produced on the old stem from these spines, and the whole matter shed and the change produced that way. I shall increase my specimens of *Ploceidae* and extend my observations upon this interesting point. Will other fellow-aviarists do likewise, and I am sure much interesting and instructive data will be the result?—W. T. PAGE (6, Rylett Crescent, Shepherd's Bush, W.)

AMPHIBIA.

Toad attacked by a Weasel.—On May 20th last, while walking by a pond not far from St. Andrews, I came suddenly upon a Weasel, which, on being roused, immediately took refuge in a drain. On coming up to the spot I discovered a Toad, evidently much exhausted, with its hind limbs terribly lacerated. The Weasel had, in all probability, been trying to drag the Toad towards the drain-mouth, as far as one could judge from the marks on the soft ground. The Weasel, from its small size, was evidently a female. Is it not unusual for a Weasel—or any carnivorous mammal—to prey upon the Toad? I can find no allusion to it in Mr. J. E. Harting's article of two years ago.—A. H. MEIKLEJOHN (St. Andrews, N.B.)

[There is apparently little record of any carnivorous mammal attacking the Toad, especially in Britain, though the American Skunk is reported as not only doing so, but eating that Amphibian as well. If we substitute Frogs for Toads—and it is probable that both frequently come under the same category—the information is not so scanty. In this country the Rat, Weasel, Badger, and Polecat have all been reported to eat, or at least attack, Frogs. Going further afield, we find similar habits ascribed to the crab-eating Mongoose of the Indian subregion, *Herpestes urva*; the common Raccoon of North and Central America, *Procyon lotor*; the Beech-Marten of Europe, *Mustela foina*; the American Mink, *M. vison*; and the Cape Polecat, *Ictonyx zorilla*. It seems too much to affirm that where the Frog is eaten the Toad is avoided, without very much further and stronger evidence.—ED.]

PISCES.

Notes from Great Yarmouth.—STRANGE POSITION OF A LESSER WEAVER.—A very unusual thing in connection with this fish occurred on May 15th. I was asked to go to a cabstand and name a strange fish which had come up out of the salt-water pipes, and which was then swimming about in a basin of water. I found it was a full-grown Lesser Weaver, *Trachinus vipera*. Our streets are watered with salt-water, sewers flushed with the same, &c., so that many thousand gallons are pumped up weekly. I have before seen Gobies' tails protruding from the pipe-holes at the back of water-carts and pulled them out; but a five-inch fish must have been particularly unfortunate to have been sucked in with the indraught.

AN ALBINO TURBOT.—A perfectly white specimen of this fish was brought in on May 24th. Length 15 inches. I have seen albino Brill previously.

BULL-DOG VARIETY OF THE SAPPHIRINE GURNARD.—Another specimen of this variety, recorded and figured last month (pp. 275-6), and of the same size, came in on May 28th. It is most remarkable that when a rare or curious fish appears it is seldom a solitary specimen. This was most

notorious in the case of the White Goby, *Latrunculus alba*, which appeared some few years ago. I obtained a specimen and put a premium on others, but the smacks-boys then obtained such a quantity that I was compelled for financial reasons to withdraw my offer.

LARGE ANGLER FISH.—An extraordinarily large specimen of this fish was brought into Yarmouth on June 3rd. Its weight I estimated at 1 cwt.

VARIETY OF THE COMMON MACKEREL.—On June 15th I secured the first—out of the thousands I have seen—concolorous variety of the Mackerel, *Scomber scomber*; length 15 inches. The back was of a deep blue-black colour without a single dot or stripe. I sent it to the Norwich Museum.

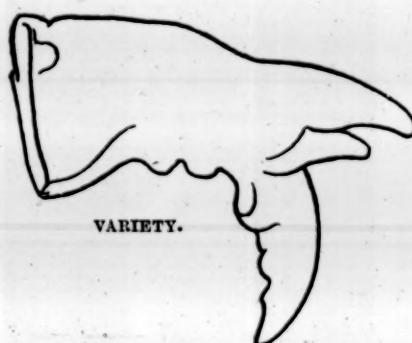
PILCHARDS.—Some of these fish, *Clupea pilchardus*, was taken here on June 23rd.—ARTHUR PATTERSON (Ibis House, Great Yarmouth).

CRUSTACEA.

Meristic Variation in the Edible Crab.—On May 29th I received from one of the stall-keepers—who recognise me as a general repository for



NORMAL FORM.



VARIETY.

all kinds of monstrosities—a strangely malformed claw of the Edible Crab, *Cancer pagurus*. It had three points, but I am sorry to say the under half of the pincer had not been preserved.—ARTHUR PATTERSON (Ibis House, Great Yarmouth).

[Bateson has already given illustrations of variations in the chelæ of this species, but with none of these does the above agree.—ED.]

ECHINODERMATA.

The Scutellated Star-fish.—At p. 170 Mr. James Sutton recorded the occurrence at Lindisfarne of a species of Star-fish he identified as *Asterias tessellata*, considered as a synonym of *Pentagonaster granularis*, Retzius. Mr. Watson has since obligingly submitted this specimen to the examination of Prof. Jeffrey Bell, who reports it as *Hippasterias phrygiana*, not uncommon on the eastern coasts. Mr. Watson, however, states that such is not his experience on his part of the coast.—ED.

